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The effects of sharing an experience on social interest in children and young adults with Autistic Spectrum Disorder and traits of Autistic Spectrum Disorder

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Abstract

Sharing an experience is seen to increase liking and create bonds in typical individuals. Individuals with Autistic Spectrum Disorder (ASD) are typically isolated; they do not appear to have the skills necessary to form bonds with others. The current research used an intervention consisting of listening to music to cause those with ASD to share an experience with a confederate. There were two conditions; one where the participant and confederate listened to the same piece of music, one where they listened to different music. 24 participants with ASD and traits of ASD took part in the study. A modified version of Nadel et al's (2000) still-face task was used as an observation measure, along with ratings in the intervention phase. A trend was seen in the overall differences between the two conditions. Social interest appeared to increase in the same music condition from before the intervention to after. Participants moved further away from the confederate but this was correlated with turning to face them, implying that sharing an experience with someone encourages eye-to-face and eye contact with that person. Findings from the present research suggest that sharing an experience with a partner increases social interest in that person. This could be the important first step in forming bonds with individuals with ASD.

Introduction

Humans have a fundamental need to belong to a social group, this is believed to be an evolutionary development. Living in a large social group has aided human survival and it is therefore logical for humans to seek membership of a social group. Humans naturally seek frequent positive social interactions, which readily leads to the formation of social attachments (Baumeister & Leary, 1995). Such social attachments are usually first formed with a primary carer, this initial attachment is seen to be very important. The first attachments can shape future attachments and enable individuals to satisfy their desire to form and maintain relationships (Bowlby, 1969). Not having this sense of belonging can be detrimental to an individual, it can have devastating effects psychologically, emotionally and behaviourally (Lakin, Chartrand & Arkin, 2008) as it does not provide a stable environment for an individual. Not only this, but Maslow (1968) placed the need to belong in the middle of his motivational hierarchy, suggesting that self actualisation cannot be achieved without this need being fulfilled. If an individual is not affiliated with a social group they are likely to be socially excluded, this can lead to isolation which will almost certainly have negative impacts. This is because such ostracism goes against the natural desire to belong. In order to avoid ostracism humans have unconscious mechanisms which are low cost and effort. These mechanisms allow a person to fit into a group and can be used to increase liking and connectedness to a person (Brewer, 1991). The use of such mechanisms can initiate social bonds being formed and an attachment with another person can be developed, thus allowing the positive effects of being part of a social group to blossom.

The majority of humans naturally use subconscious mechanisms to increase connectedness to another person. Two common mechanisms used are mimicry and I-sharing. There is a natural tendency within humans to mimic one another, one's behaviour appears to change passively and unintentionally to match others in the surrounding social environment. This mimicry is known as the chameleon effect (Chartrand & Bargh, 1999). Mimicry is believed to be a non-conscious process which facilitates social interaction and interpersonal bonding (Chen, Chartrand, Lee Chai & Bargh, 1998), allowing social attachments to be formed. Mimicry is generally very subtle and can be seen in things as small as synchrony between partners, facial expressions and behavioural matching (Chartrand & Bargh, 1999). It is thought that humans show mimicry as a way of taking another person's perspective, allowing one to anticipate their partner's behaviours and reactions (Davis, 1983). This allows for a smooth interaction giving the impression of connecting with the other person. Research suggests that mimicry occurs at a level greater than chance. Individuals reported better interactions when their partner mimicked them, even when the two participants were not known to each other. It was also noted that mimicry is seen more often in those who frequently take the perspective of others, rather than those who rarely engage in this cognitive process. Van Baaren, Holland, Steenaert and van Knippenberg (2003) demonstrated that mimicry can potentially have behavioural consequences. This research suggested that the use of mimicry in a restaurant setting can increase the size of tips given to staff, implying that these findings are not merely applicable to laboratories. It therefore appears that mimicry has adaptive functions as a subconscious communication mechanism and can increase liking for another person (Schefflen, 1964). A lack of this chameleon effect could be disastrous to individuals; it would be likely to lead to social exclusion and feelings of isolation.

This could further lead to negative psychological, emotional and behavioural impacts to an individual.

The subconscious method of mimicry to increase interpersonal connectedness is seen in the majority of humans. However, this mechanism is rarely seen in individuals with Autistic Spectrum Disorder (ASD). Those with ASD appear to struggle to be affiliated with a group and tend to be very isolated. This disorder typically shows a triad of impairments in communication, imagination and social interaction. Deficits in social interaction and communication are likely to be the cause of social exclusion among individuals with ASD. Even when surrounded by others with the same disorder those with ASD tend to be isolated. This isolation is present despite the fact that those with ASD show a desire to take part in social interaction and to develop friendships (Frith, 2004), however they do not have the necessary social skills to form attachments to others. This comes from a number of things; partially from the lack of spontaneous greetings shown, and partly from a lack of coordination of behaviours. Research by Hobson and Lee (1998) saw that individuals with ASD were less likely to offer spontaneous greetings and farewells to others, this prevents conversations from being started. They are also less likely to demonstrate both nonverbal and verbal responsive behaviours which are used as indicators of attention in social interaction (Davis & Perrowitz, 1979). Such acts of attention are important and need to be present in order to form social bonds (Miller, Lechner & Rugs, 1985). As well as these, individuals with ASD were seen to be less likely to establish eye contact than individuals with mental retardation. This lack of eye contact can make conversation difficult as it is hard to understand another person's viewpoint without making eye contact with them. It is also seen that eye contact can facilitate attraction in social relationships (Ellsworth & Ludwig, 1972). Coordination between behaviours was observed to be unusual, for example eye-to-face contact was not combined with a smile or with verbalisation as they are in typical socialisation (Phillips, Baron-Cohen & Rutter, 1992). Such unusual behaviours could explain a lack of social relationships as individuals do not initiate contact with others through typically friendly behaviours. All of the research into this area helps to explain why ASD is a lonely disorder; those with ASD are isolated by their impairments. Isolation can lead to a number of problems as the natural desire to seek attachments to other humans is not fulfilled. Research by Sebastian, Blakemore and Carman (2009) suggested that ostracism negatively affects anxiety and four specific social needs; self-esteem, belonging, control and meaningful existence. Ostracism therefore has a negative effect on typically developing individuals and those with ASD. The effects may be similar, but perhaps not identical.

Children with ASD show a desire to have friends as they report feeling lonely. This suggests that there is an unfulfilled desire to have friends and a lack of affective bonding (Bauminger & Kasari, 2000). Although previously it has been assumed that individuals with ASD seek aloneness it is important to remember that this is not the same as loneliness, as aloneness is seen as a pleasant experience. More recent studies suggest that there is a desire to be involved in relationships with others, at least for high-functioning children with ASD (Bauminger & Kasari, 2000). The fact that children with ASD feel lonely suggests that the disorder is social-cognitive; this means that they struggle to understand and compare their experiences to that of other children. This is rather than the disorder being affective, meaning that those

with ASD do not understand the emotional aspects of loneliness and therefore feel no need for affective bonding. It has been implied that children with ASD lack the capability to comprehend friendship in the way that typical children do. Hobson (1993) suggested that individuals with ASD tend to stand on the outside of relationships and observe. They fail to get involved meaning they do not experience friendship in the way typical children do. This failure to experience friendship in the same way as typical children means that a social bond is not felt. Thus explaining why those with ASD report feelings of loneliness despite reporting having at least one friend.

Failure to feel a bond with another human is thought to lead to a sense that the world a person is living in is fragile. The world may seem as if it could vanish at any time, as experiences cannot be validated if they are never shared with another person (Yalom, 1980). Not feeling secure in the world is a reasonable explanation for difficult behaviours. If this is the case affiliation between individuals with ASD and another individual is likely to make behaviours more manageable, it could also make experiences had by those with ASD more enjoyable. Creating a bond with an individual who has ASD is likely to be difficult, especially as people are only likely to create bonds with people they feel understand them. This is particularly hard when working with individuals with ASD as there is often a difference in senses between ASD and typical people. Those with this disorder may have heightened or dulled senses (Davidson, 2010) and may experience things in ways typical individuals would not. Even if an event is not experienced in the exact same way, sharing it with someone else would make the experience more validated. Feeling that the world one is living in is not secure is likely to be unnerving to an individual, it is therefore important to encourage bonds to be formed with those with ASD. Otherwise, ostracism such as this could explain why so many difficult behaviours are seen in those with ASD.

An alternative method of increasing social interest to mimicry is I-sharing, which is the sharing of subjective experiences. I-sharing is based on James' (1890) idea that the self can be separated into two parts, the "I" and the "Me". The "I" is thought to refer to the self as a subject. It is the part of a person which perceives, interprets and experiences stimuli. The "I" is not a stable concept; it changes from one moment to the next. In contrast, the "Me" is considered to be the same as self-concept, the representation a person has of themselves. This is a lot more stable as it consists of objective data such as hair colour and birth place. People can be similar in terms of objective information and in the sharing of subjective experiences or I-sharing, and both appear to increase interest in a person. This is not a subconscious method in the same way that mimicry is, as it is not something humans do, rather it is something humans are sensitive to. An individual is not required to do anything other than experience something in order for I-sharing to be effective. The majority of humans will engage in social sharing after an emotional event, this reciprocal interaction is seen to stimulate empathy and emotional communication which in turn can strengthen social bonds (Rime, 2007).

Pinel, Long, Landau, Alexander and Pyszczynski (2006) set up a study to investigate whether I-sharing had a larger impact on interpersonal connectedness than objective similarities. In the initial studies participants were given a scenario to read involving two students, one objectively similar and one objectively dissimilar to themselves.

One student in the scenario then I-shares with the participant through a joint musical opinion. Results suggest that people prefer others who are objectively similar and who I-share but they do not imply that either one is more influential. The second study conducted by Pinel et al. (2006) focussed more on I-sharing and used a spontaneous reaction to a stimuli to do this. The reaction used was giggling. Results from this seem to suggest that I-sharing can offer a pathway to interpersonal connectedness which is more powerful than the impacts of objective similarity. It even appears possible to undo any distaste present for dissimilar others through I-sharing (Rosenbaum, 1986). It is likely that I-sharing is more powerful than objective similarities. When people I-share they believe that their self and another person's self have united in an experience. This leads to people feeling closer to one another. I-sharing can make people feel more connected even when individuals have no objective knowledge of the other person. It is unlikely that people will ever experience an event in exactly the same way as another person. However, knowing that someone else has shared the same experience, no matter how it was perceived, can be seen to increase interpersonal connectedness (Pinel et al., 2006).

I-sharing requires less from those involved, as it is not necessary to watch another person or engage with them, which is required to an extent with mimicry. It can also be assumed from the pilot study, that I-sharing is viewed as less threatening than mimicry to individuals with ASD. Those with ASD who took part in the pilot study appeared to prefer tasks where they were not required to make eye-to-eye or eye-to-face contact as this can make them feel uncomfortable. Unlike mimicry, I-sharing can be used in a way which does not require any looking from the participant (Pinel et al., 2006). Sharing an audio experience, rather than a visual experience, requires even less from the participant. Sharing this experience does not rely on the participant directly engaging in the activity as they can passively listen. The participant is not required to make eye contact with the confederate at any time. As I-sharing is less intense than mimicry in this way, it is potentially a more suitable way to attempt to initiate and therefore increase social bonds in individuals with ASD.

In order for this research to come to a conclusion about whether sharing an experience can increase the likelihood of a social bond being created, a suitable measure needed to be found. With typical participants a questionnaire may be used but in this case observations are more appropriate, as they do not require language or understanding of concepts from the individual. It would be difficult to measure "liking" in individuals with ASD, as this is an internal state which appears to be difficult for those with ASD to comprehend. In order to measure "liking" the observer would need to infer "liking" from observations. This could be very subjective and therefore not a reliable measure. It is relatively easy for one to observe the interest an individual shows in another person and this is a reasonable basis for a social bond to be formed on. Therefore this research investigated how social interest could be influenced by sharing experiences with others. This was observed using a measurement based on Nadel et al.'s (2000) modified version of the original still-face paradigm. In this version, the still-face task was used before and after an intervention to assess interaction between a child with ASD and a confederate.

During the still-face task the confederate was required to sit for three minutes like a statue with no facial expression or movements (Heimann, Laberg & Nordøen, 2006). This was videoed and analysed from the moment the child entered the room. The

items analysed were: facial expression, look, proximity, social gestures and sounds (Nadel et al., 2000). Joint play was added in as an additional method as it was seen as appropriate to this study, not including it could ignore any vital attempts to interact with others. The still-face task was modified to make it more appropriate to the present study. As co-operating in research is a rather strange thing for a child to do, this study intended to make the children as comfortable as possible so they would be willing to take part in future research if required. Therefore children were not filmed as soon as they entered the room, they were firstly introduced to the researcher and the confederate before filming began. The confederate in the still-face task sat and engaged themselves in fairly meaningless tasks, such as making a dominoes maze. If the participant engaged with the confederate then the confederate would respond, but the confederate made no initial attempts to interact with the participant. This was seen as more appropriate as a lot of work is done with individuals with ASD regarding social interaction, and ignoring attempts to interact may have negative consequences in the future.

The present research investigated how sharing an experience may influence the levels of social interest shown in children and young adults with ASD. Social interest was measured using a modified version of Nadel et al's (2000) still-face paradigm. The experience shared by the participant and the confederate was that of listening to a piece of music, either at the same or at a different speed to the confederate. In order for the participant to be aware of whether their music was the same as the confederates, the confederate tapped a pen in time to the music. This allowed the participant to hear the beat of the confederate's music as well as their own. Therefore participants had knowledge of whether they were sharing an experience or not. Based on previous research the sharing of this experience should increase the amount of social interest shown in the individual the experience was shared with. Predicted outcomes of the current study were that participants who listened to the same music as the confederate would show an increase in social interest in the second observation phase relative to the baseline. It was predicted that those who listened to different music to the confederate would show a decrease in social interest in the confederate after the intervention comparative to the baseline.

Method

Participants

A total of 24 individuals aged from five to 19 years were recruited. Participants were diagnosed with varying levels of ASD and traits of ASD and schools provided statements for the participants. The participants were recruited from special schools in Devon, South West England. There were two girls and 22 boys who participated in the study. Not all had verbal language, where this was the case the task was explained by a member of teaching staff in Makaton, a form of sign language, as well as in spoken language.

Materials

Two sets of headphones were needed for participants and confederate to listen to the music in the intervention stage. A split audio jack was needed to output the music from the laptop, allowing different music to come out of the two sets of headphones. Three variations of a piece of music were saved to a laptop; one was a

sped up version, one was a slowed down version, and the final piece was combined so the fast music was played in one set of headphone and the slow music played in the other set. All of the pieces of music were the same duration, 2 minutes 59 seconds.

A selection of stimuli including a rubix cube and dominoes were provided for participants to look through during the still-face task. These stimuli were not too engaging so as not to prevent any forms of interaction. A quiet classroom was required, with an area where participants could sit on the floor. A table and two chairs were also needed for the intervention. Two pens were needed for the confederate and participant to tap along with the music. A video camera and a tripod were used to film the participants in order to analyse observations. A stopwatch was required to time the still-face phases. A list of participants randomly assigned to conditions was necessary. Schools confirmed that they wanted to take part in the study. Consent letters were sent home to parents/guardians of participants before the experiment proceeded. Briefs and debriefs were also needed to give to the participants if they wanted them, both were mainly completed verbally as this was more appropriate for the participants chosen. An analysis form was also necessary in order to analyse the data.

Design and Procedure

A confederate was selected who had appropriate experience with individuals with ASD and traits of ASD. The confederate was a 22 year old female from the University of Plymouth who had previously had a suitable CRB check conducted. The same confederate was part of the study throughout.

Consent letters were sent home to parents/guardians of participants. The schools were given choice of the form of consent required. Letters of assumed consent could be used, with a two week period to return the letters if they did not want their child to participate. Alternatively schools could use opt-in consent letters; a two week period was given to allow parents to reply before proceeding with research with those who had consent. These letters contained full details of the study, with the two conditions explained and the expected outcomes stated.

On the day of study the participants were individually introduced to the experimenter and the confederate before being verbally briefed. Briefing took place individually and participants were asked if they had any questions and if they wished to take part in the study. There was no deception in the brief; participants were informed which condition they were in, however they were not informed of the expected outcome of the study. If they did want to take part they were asked to sit on an area on the floor where the confederate was already sitting. Both participant and confederate were then presented with a tray of items which they were told they could look through and play with. The video camera was started and 3 minutes was timed. During this period the confederate made no attempt to interact with the participant, however the confederate would respond if the participant made attempts at interaction.

After 3 minutes the participant and the confederate were asked to move and sit at a nearby table. Here they sat side-by-side, and put on a set of headphones each. A pen was put in front of both individuals which they were told they could tap in time with their music if they wished to. The music was then played to the participants and

confederate. There were three versions of the music; one was the same pieces, both slow, one was the same pieces, both sped up. One lot of music was different for the separate headphones, one set played the fast music and one set played the slow music. This was to prevent any differences being caused by the speed of the music. For the duration of the music the confederate tapped their pen in time with the music so the participant could see and hear their rhythm. This was also filmed.

Once the music had finished participants were asked to take off their headphones. The confederate then went back to sitting on the carpet, participants were asked to sit on the carpet again. They were told that they had another 3 minutes to look thorough and play with the items in the tray, filming continued for this period. After this 3 minute period was over filming was stopped and participants had the study explained to them, they were offered a written debrief. Videos were analysed with an analysis form which looked at various areas related to social interest.

Analysis

The entire study was videoed so that it could be analysed effectively. During the intervention the participants were observed and data was recorded in relation to movement with music, listening and whether headphones remained on throughout. Movement with music was rated in terms of duration in seconds. Apparent listening to music was rated on a scale of 1 to 10 with one being no listening shown and 10 being intent listening. Whether participants took their headphones off was noted as "yes" or "no", where "0" was "yes" and "-1" was "no".

A second analysis looked at the participant's proximity in relation to the confederate before and after the intervention. It was noted whether the participant sat opposite or next to the confederate and how close they were to them. Proximity was rated on a 1 to 5 scale, with 1 being close and 5 being far away. This gave another idea of the effect the intervention had on the participant.

Videos collected were analysed using a similar method as Nadel et al's (2000) version of the still-face task. The pre and post intervention periods were coded in terms of how much social interest was shown in the confederate by the participant. This was categorised into 5 sections; gaze, facial expressions, directed vocalisation, social gestures and joint play. Gaze measured how long the participant spent looking at the confederate or at the object being used by the confederate. Facial expression measured any positive facial expressions, such as smiling, which was directed at the confederate by the participant. Directed vocalisation measured how much time the participant spent talking the confederate, it was categorised as directed vocalisation so no echolalia was included. Social gestures measured any of the following gestures made by the participant to the confederate; give, take, point, show and imitate; and finally joint play.

Results

The significance level for this data was .05 because this experiment has not been conducted before.

Intervention analysis data

Table 1: The mean duration of listening measured, apparent listening and whether headphones were removed or not during the intervention phase

	mean		p
	same	different	
movement	80.00	49.50	0.064
listening	8.42	6.83	0.309
headphones	0.00	-0.17	0.478

Table 1 shows the mean duration of listening in the intervention stage, the mean rating of apparent listening to music and whether participants removed their headphones or kept them on. It can be seen from table 1 that the amount of movement was higher in the same music condition, where the mean duration was 80 seconds, than the different music condition, where the mean duration was 49.5 seconds. Apparent listening was rated as higher out of 10 in the same music condition, with a mean rating of 8.42, than the different music condition, which had a mean rating of 6.83. Whether participants took off their headphones in the intervention stage was rated as 'yes' or 'no', where 0 was 'no' and -1 was 'yes'. Table 1 shows that in the same music condition the mean for headphones being taken off was 0 whereas the mean in the different music condition was -.17. This means that 17% of participants in the different music condition took their headphones off.

An independent samples t-test was conducted on the movement data in order to see whether these results were significant. A trend was seen in the difference between the two conditions, $t(22) = 1.05$, $p = .064$. To see whether the removal of headphones and apparent listening were significant 2 x 2 Chi-squared tests were conducted with bootstrapping to account for the small sample size. Neither of these values were significant, for listening $\chi^2(1, N = 24) = .06$, $p = .31$, and for headphones being removed, $\chi^2(1, N = 24) = .14$, $p = .48$.

Proximity data

Table 2: Mean and standard deviation of the proximity of participants in comparison to the confederate and the direction of facing, results for before and after the intervention, the difference and the significance level

		pre-intervention		post-intervention		difference		p
		mean	standard deviation	mean	standard deviation	mean	standard deviation	
difference facing	same	.58		.33		-.08	.50	.087
	different	.25		.33				
difference proximity	same	2.33	1.50	2.92	1.24	.12	1.15	.049
	different	3.25	1.22	2.92	1.44			

The data in table 2 shows the mean of the direction participants faced and the mean and standard deviation of the proximity data. Table 2 shows that the means between conditions before and after the intervention period were similar. The means after the intervention were the same, the mean direction of facing was .33, where -1 showed a

move from next to, to opposite, 0 showed no change and 1 showed a change from opposite to next to the confederate. The mean proximity was 2.92. A 3 x 2 Chi-squared test with bootstrapping to account for the small sample size was performed. This was run on the data for the difference seen in the direction the participant faced before and after the intervention. This was run in order to see whether the direction faced by participant was significant. A trend was seen in the change of direction faced between the two conditions, $\chi^2(2, N = 24) = 4.89, p = .087$. An independent samples t-test was conducted on the differences seen in proximity before and after the intervention. This was done to see whether there was a significant difference between the conditions. Results showed that the difference seen between conditions were significant, $t(22) = 2.08, p < .05$. This shows that the participants moved further away from the confederate after sharing experience.

A correlation was run on the difference in proximity and the difference in direction of facing to identify whether these measures were related. A significant correlation was seen between direction faced and proximity, $r(22) = -.66, p < .01$.

Still-face analysis data

Table 3: Mean duration of social interest activities shown pre-intervention and post intervention, the difference between the scores and the results of the independent samples t-test

		pre-intervention		post-intervention		difference		p
		mean	standard deviation	mean	standard deviation	mean	standard deviation	
gaze	same	60.08	80.81	52.17	71.44	-10.17	47.80	.823
	different	62.83	70.87	50.42	64.22			
facial expression	same	7.25	19.06	1.33	2.23	-3.50	12.41	.352
	different	1.83	6.04	0.75	2.30			
vocalisation	same	12.17	30.66	15.58	36.62	-11.96	67.56	.274
	different	43.33	112.60	16.00	25.79			
gestures	same	2.17	5.22	2.83	6.97	.33	2.48	.522
	different	0.92	2.11	0.92	2.31			
joint play	same	10.92	37.82	28.42	50.29	4.25	45.92	.162
	different	37.83	60.29	28.83	60.24			
average	same	18.52	34.71	20.07	33.51	-4.21	35.24	
	different	29.35	50.38	19.38	30.97			

The data in table 3 shows the mean and standard deviation for the time spent taking part in each social activity for both conditions. It also shows the mean and standard deviation of the differences from before to after the intervention. Table 3 shows that the biggest initial difference between the two conditions was seen in the mean vocalisation before the intervention, with the same music condition at 12.17 seconds and the different music condition at 43.33 seconds. After the intervention the mean duration for vocalisation went up in the same music condition and down in the different music condition. There was also a large difference between conditions seen

in the duration of joint play before the intervention; the mean duration in the same music condition was 10.92 seconds and 37.83 seconds in the different music condition. After the intervention the same music condition had a longer mean duration and the different music condition, a shorter mean duration.

From table 3 it can be seen that the largest mean difference from before to after the intervention was seen in vocalisation, where there was a difference of -11.96 seconds. The smallest mean difference was seen in gestures, which increased by .33 seconds. An independent measures t-test was conducted to investigate significance levels of these changes. None of the changes in social interest were significant, the area which showed the most trend was joint play, $t(22) = 1.45$, $p = .162$.

All of the difference results were combined to see if the results for the overall durations were significant. Results were not significant, $t(22) = 1.05$, $p = .307$.

Table 4: The mean, t and p values for the standardised difference scores shown in duration before and after the intervention

	mean	t	p
difference gaze	.06	.23	.823
difference facial	-.12	-.46	.652
difference vocalisation	.37	1.03	.315
difference gestures	.05	.27	.789
difference joint play	.52	1.50	.148

Table 4 shows the standardised means for the difference between duration data form before to after the intervention. It also shows the t and p values for this data. As there was a large variation in the durations between conditions, scores were standardised and an independent measures t-test conducted. The largest mean difference can be seen in table 4 and is in joint play, where the difference was .52. The smallest difference was seen in gestures with .05. Standardising the results did not make any of the differences observed significant. The area which showed the most change was joint play, $t(22) = 1.5$, $p = .148$, and gaze showed the least change, $t(22) = .23$, $p = .823$.

In order to investigate whether there was a trend between measures the correlations were calculated. Significant positive correlations were seen in the differences between gaze and vocalisation, $r(22) = .45$, $p < .05$, gaze and joint play, $r(22) = .61$, $p < .01$, and in vocalisation and joint play, $r(22) = .52$, $p < .01$. Significant negative correlations were seen in gaze and gestures, $r(22) = -.48$, $p < .05$, vocalisation and gestures, $r(22) = -.51$, $p < .05$, and in gestures and joint play, $r(22) = -.52$, $p < .01$.

Discussion

The purpose of the present research was to investigate whether sharing an experience with someone increased social interest in children and young adults with

ASD and traits of ASD. Significance levels used were two-tailed as research in this area has not been done before. This made it less probable that significant results would be seen and in future one-tailed significance levels could be used. Using this level of significance means a significant difference is more likely to be seen. A trend was seen in movement to music during the intervention phase. Those who listened to the same music as the confederate appeared to show more movement with the music than those who listened to different music to the confederate. This suggests that individuals who shared an experience with the confederate enjoyed this experience more than those who had a different experience to the confederate. This also seems to imply that individuals with ASD did notice a difference in rhythm, they were therefore aware that they were or were not sharing an experience with the confederate.

Although not significant, a trend was seen in movement to music. Participants who listened to the same music as the confederate moved with it more than those who listened to different music. Participants were only seen to remove their headphones when listening to different music to the confederate. This finding was not significant, however if more participants were involved the change may have been significant. The proximity data showed a significant difference in the distance participants sat from the confederate. It appeared that participants sat further away from the confederate when listening to the same music, this was significantly correlated with them turning to face the confederate. Facing a person could be seen to be more sociable as it encourages eye-to-face and eye-to-eye contact. Such behaviour is not encouraged by sitting next to a person. It seems logical that participants would sit further away from the confederate when facing opposite them as this is a personal space issue. The majority of people would naturally sit further away from someone when opposite than when next to them.

Findings from the duration data suggests that gaze, vocalisation and joint play are all linked to social interest as these were significantly, positively correlated. Gestures as a measure were significantly negatively correlated to the previous measures, implying that this measure is inversely related to social interest. Although not significant, this suggests that when gestures decrease, social interest increases. Facial expressions did not significantly correlate with any of the other measures. This proposes that facial expressions as a measure are not related to social interaction. Overall, duration data increased, suggesting that there is an increase in social interest and the majority of these measures are related.

The findings from this study support the original hypothesis; an increase was expected to be seen in social interest within participants who had listened to the same music as the confederate. This appeared to be the outcome as overall participants who listened to the same music as the confederate showed more social interest in each of the areas of measurement: intervention, proximity and duration. Although findings were not significant, the trend seen in movement to music suggests that individuals who shared an experience with the confederate enjoyed it more than those who did not share an experience. The difference in proximity significantly increased after the intervention, with participants moving further away from their partner. However, this correlated with them turning to face the confederate. Turning to face a person encourages eye-to face and eye-to-eye contact. Although moving further away from someone is viewed to be linked to liking

a person less (Kahn & McGaughey, 1977), this may not be true of the present findings. The correlation with change in the direction faced and proximity implies that the change in distance is linked to personal space rather than dislike for a person. Facing towards another person is rarely seen in individuals with ASD (Hobson & Lee, 1998), so the fact that participants turned to face the confederate is an interesting finding. Sitting opposite another person can be viewed as more socially engaging than sitting next to them. It encourages individuals to look directly at their partner allowing one to observe the reactions and facial expressions of the other person. Findings from the duration measure, although not significant, suggest that sharing an experience with a partner does increase the amount of social interest seen in individuals with ASD. It can therefore be seen that overall the results all point to the idea that sharing an experience does increase social interest in individuals with ASD. This effect appears to be present not only in typical individuals but in those with ASD too.

Previous research supports the findings of this study, Pinel et al.'s (2006) study suggested that typical individuals feel closer after sharing an experience as they believe that their self and another person's self have united. This experience of I-sharing seems to make people feel more connected, these findings were specific to typically developing individuals. The present research proposes that these findings are also shown in individuals with ASD and traits of ASD. With a larger sample size the trend seen, which implies a similar affect as Pinel et al.'s (2006) study, is likely to be significant. Findings from the current research are not conclusive but this trend suggests that sharing an experience positively affects social interest in individuals with ASD. Sharing the same experience with another individual gives a pair something in common; appearing to lead to more social interest in the person than if the two had experienced something different.

A main finding was that participants turned to face the confederate after sharing an experience with them. Facing towards another person encourages eye-to-face and eye contact which is an especially important factor in social interaction as it can facilitate attraction (Bauminger & Kasari, 2000). Not only this but eye-to-face and eye contact lead to the opportunity for an individual to observe the facial expressions of the other person. Observing the emotional facial expressions of others triggers the stimulation of the same muscles in the observer via the mirror neuron system (Gallese, Eagle & Migone, 2007). The purpose of mirror neurons is to act as neural matching mechanisms which are crucial in order to establish an empathic link between individuals (Gallese, 2001). These links to another person increase feelings of relatedness to that individual, which leads to the sharing of emotional experiences. Research by Pinel et al. (2006) suggests that this experience of I-sharing will increase interpersonal connectedness further. The use of mirror neurons will trigger empathy and relatedness, allowing more intense experiences to be shared. Sharing an emotional event stimulates emotional communication which strengthens social bonds (Rime, 2007). This is likely to have a larger impact than sharing an experience which is not emotional to either subject. A loop can be seen taking individuals from facing a person to feeling a sense of closeness to them. Initial sharing of experiences, as demonstrated in this study, appears to be effective in starting this cycle. It therefore seems that the findings from this research are the essential initial step in the process of connecting with individuals with ASD.

Results from this study also seem to suggest that individuals with ASD and traits of ASD do not show the same reaction to ostracism as typically developing individuals. When ostracised, both typically developing children and adults appear to show an increase in mimicry and conformity in order to integrate themselves within a group (Over & Carpenter, 2009). However, individuals in the present study did not show this reaction to ostracism. Individuals in the different music condition showed fewer attempts to engage with the confederate after the intervention. The different music condition can be seen as ostracising an individual as they are separated from one another through the intervention. This did not appear to instigate attempts at mimicry or conformity. In fact the opposite seemed to happen, participants in the different music condition seemed to separate themselves from the confederate after the intervention. Less social interest was shown in the confederate by the participant, thus implying that individuals with ASD and traits of ASD react differently than typically developing individuals when ostracised. Rather than subconsciously trying to overcome this issue and affiliate with a person, those with ASD appear to retreat and ignore others. This suggests that including those with ASD in activities is vital when trying to build relationships. Ostracism looks to have purely negative effects on individuals with ASD and traits of ASD, therefore it is important not to isolate these individuals. Efforts should be made to include those with ASD at all times and not exclude them. The present research, although not significant, suggests that exclusion, even for a short period, can have negative social consequences.

Individuals with ASD and traits of ASD appear to respond differently than typically developing individuals do to social cues. Despite this the present research suggests that those with ASD are sensitive to social cues. Previous research by Dawson et al. (2004) presents individuals with ASD as having impairments in social attention and a lack of social information input. Findings from the current research imply that those with ASD are sensitive to social cues. Although they may have impairments, this deficit is possibly not as detrimental as suggested by Dawson et al. (2004). After the intervention, participants who listened to the same music as the confederate showed a trend in the increase in social interest. This finding implies that those with ASD were aware of sharing an experience with another person, suggesting that they pay attention to others, even if only at a low level. Participants must have been aware of the confederate during the intervention phase otherwise no difference between the conditions would have been measured, and any difference seen could have been accounted for by chance. There was a difference in the amount of social interest seen in the various measures although not all were significant. Participants were informed whether they would listen to the same music as the confederate or not. However this is unlikely to have affected outcomes, as participants were not aware of the difference this was expected to make. It appears that individuals with ASD actually are susceptible to social cues and these cues do effect their behaviour, but to a lesser extent than the effect seen on typical adults (Pinel et al., 2006).

In the present study participants interacted with the confederate on a one-to-one basis. A one-to-one interaction may have made it easier for them to pick up on any social cues displayed. Individuals with ASD show less ability to shift attention from one person to another (Swettenham et al., 1998). If previous studies have required individuals to attend to more than one person this could have caused the apparent impairment in picking up on social cues. Therefore the susceptibility of individuals with ASD and traits of ASD may be largely influenced by the number of people they

are required to attend to. It therefore may not be possible to generalise the results from this study to group situations as the results were obtained from one-to-one interactions.

A main limitation of the present research was that a small sample size was used. Previous research into ASD has used samples as small as eight (Nadel et al., 2000), so 24 participants, as used in this study, is not a small sample given the requirements. However the results appeared to show only a trend in the increase in social interest after sharing an experience. If more participants had been involved then these results may have been significant. The population size was extended by allowing the inclusion of individuals with traits of ASD as well as those with a formal diagnosis. In an ideal situation the population would involve only those with a formal diagnosis of ASD. Other disorders may be affected differently by the intervention and may cause variations in the results. In the current research this was not possible as there were a limited number of participants available. Reducing the population size would have caused fewer participants to be involved, making it hard to see any difference in results. Participants were randomly assigned to conditions; this may have led to one group having more high functioning participants than the other. This mismatch may explain the findings, rather than findings being due to the intervention. This is unlikely due to random assignment to conditions but is still a possibility.

The intervention used in the current study was in the form of listening to music through headphones. This required participants to not only listen to music, but also to be aware of the rhythm of their own music. This allowed them to be sensitive to the confederates tapping and its relevance to their own experience. Participants appeared to be aware of the rhythm of their own music and therefore whether it was in or out of time with the confederates. However, this intervention may have been too subtle. An intervention which demonstrates a more obvious sharing or differing of experiences could lead to a larger trend, and perhaps significant results. Watching videos with sound would lead to more stimulation (Craike & Lockhart, 1972). This may make it clearer to participants whether they are experiencing the same thing as the confederate or something different. A video intervention may be more engaging as a video will appeal to multiple senses whereas music only engages one sense. Therefore the participants may have got distracted whilst listening to music and not allowed the intervention to have its full effect, watching a video could solve this issue. Ensuring that the intervention is engaging could lead to it having more of an effect of the participants. However, it is important to use an intervention which is suitable for all participants. The age difference and the variety of interests throughout ASD must be kept in mind if doing this. A topic which is not overly stimulating could be best as it would not generate strong biases for or against the topic. Strong biases for or against the intervention could cause differences in results, these would be based on opinions rather than liking of the person. However, choosing a more engaging intervention may lead to a larger change post intervention in comparison to the baseline, potentially leading to significant results.

The implications of this study may be seen in school or therapy settings. Having a way to increase social interest and potentially kick start affiliation and connectedness is likely to lead to more progress within schools and therapies. Creating a bond between a therapist or teacher and a student with ASD, could lead to a better understanding of the individual. This would allow the work involved to better suit the

individual and potentially lead to more progress. Having an affiliation with a teacher or therapist may allow a student to share information about themselves comfortably leading to more trust and therefore a more secure bond. Not only could a bond between an individual with ASD and another person lead to more progress it could also reduce difficult behaviours. This could be an implication of the present research as individuals with ASD may feel more secure in the world. This could be due to them validating their experiences with others once they have felt a bond with them. Having a sense of security in the world rather than feeling that the world around oneself is fragile, could reduce difficult behaviour in individuals with ASD. This is linked to progress, as less difficult behaviour allows teachers more opportunity to help students progress academically.

From the present study a number of areas of further research have been opened up. An initial idea, which has been previously mentioned, is the alteration of the intervention from a piece of music to a short video. This would make the two conditions more obvious to a participant, allowing them to clearly tell whether they have shared an experience with the confederate or not. A larger effect may be seen due to this. A second area of further research would be to investigate the impact the confederate can have on the results seen. The confederate in the present study was a female adult. Investigation into whether the same results can be seen with a male confederate should be conducted. More interestingly, research into the effects of sharing experiences with peers may find different results. It would be valuable to know whether the findings from the current study are only applicable to peer-adult interactions or if they can be generalised to peer-peer interactions. A final area of further research should investigate how far these findings extend in terms of the impact of the intervention. The present research saw a trend in the effects of sharing an experience immediately after the intervention. A further study could look at how long term these effects are and whether the intervention has positive outcomes in different environments. Investigating into whether sharing an experience can decrease difficult behaviours should be conducted. Studying whether there are increases in both social skills and the ability to work with another person after sharing an experience with them would be worthwhile to psychology. Such research could prove the suspected implications and potentially make a large difference to the lives of those with ASD and traits of ASD.

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